

IN THE CLAIMS:

Please AMEND claims 27-50, as follows. For the Examiner's convenience, all claims currently pending in this application have been reproduced below:

1-26. (Canceled)

27. (Currently Amended) An apparatus for determining a position of a mark on an object placed on a stage, said apparatus comprising:

an image sensing system which has an image sensor and obtains image data of one accumulated image of the mark by accumulating image signals corresponding to an image of the mark ~~within the~~ formed on said image sensor during an accumulation period;

a measurement system which measures a position of the stage plural times during the accumulation period of said image ~~sensing system~~ sensor; and

an arithmetic section which calculates the position of the mark based on the image data obtained by said image sensing system and ~~the~~ data of plural positions of the stage measured by said measurement system during the accumulation period of said image sensor with respect to the image data.

28. (Currently Amended) ~~The~~ An apparatus according to claim 27, wherein said image ~~sensing system stores an~~ sensor accumulates the image ~~signal~~ signals of the mark during ~~an observation~~ the accumulation period and obtains the image data used for determining an average

position of the mark during the ~~observation~~ accumulation period ~~based on the stored image~~
signal.

29. (Currently Amended) ~~The~~ An apparatus according to claim 27, wherein said image sensing system and said measurement system obtain the image data of the mark and the positions of the stage, respectively, during substantially the same observation period.

30. (Currently Amended) ~~The~~ An apparatus according to claim 27, wherein after the stage moves to a position where said image sensing system can sense the image of the mark and before the stage stops, said image sensing system and said measurement system start sensing the image of the mark and measuring the positions of the stage, respectively.

31. (Currently Amended) ~~The~~ An apparatus according to claim 27, wherein said image sensing system comprises an off-axis scope.

32. (Currently Amended) ~~The~~ An apparatus according to claim 27, wherein said measurement system comprises an interferometer.

33. (Currently Amended) ~~The~~ An apparatus according to claim 27, wherein
the object has a plurality of areas, and the mark is formed in correspondence with
each of the plurality of areas, and

a position of each of the plurality of areas is calculated based on the positions of the marks obtained ~~for~~ with respect to a subset of the plurality of areas.

34. (Currently Amended) ~~The~~ An apparatus according to claim 33, wherein said arithmetic section calculates a positional deviation of the mark with respect to each of the subsets based on the image data obtained by said image sensing system and the positions of the stage measured by said measurement system, and calculates the position of each of the plurality of areas based on the positional deviations.

35. (Currently Amended) ~~The~~ An apparatus according to claim 30, wherein said apparatus is arranged such that the stage is moved at a substantially constant speed in the position where said image sensing system can sense the image of the mark.

36. (Currently Amended) An exposure apparatus comprising:

- a stage on which a substrate is placed;
- a lens section which projects a pattern onto the substrate;
- a first measurement system which has an image sensor and measures a position of a mark formed on the substrate based on image data of one accumulated image of the mark that is obtained by accumulating image signals corresponding to an image of the mark ~~within~~ formed on said image sensor during an accumulation period;

a second measurement system which measures a position of the stage plural times during the accumulation period of said ~~measurement system~~ image sensor;

a calculation section which calculates the position of the mark based on a ~~measurement result~~ data of the position of the mark measured based on the image data by said first measurement system and ~~measurement results~~ data of plural positions of said stage measured by said second measurement system during the accumulation period of said image sensor with respect to the image data; and

a positioning system which drives the stage based on data of the position of the mark calculated by said calculation section.

37. (Currently Amended) ~~The~~ An apparatus according to claim 36, wherein said ~~first measurement system includes an image sensing system arranged to sense an image of the mark, said image sensing system storing an~~ image sensor accumulates the image signal signals of the mark during ~~an observation~~ the accumulation period and ~~obtaining~~ obtains the image data for determining an average position of the mark during the ~~observation~~ accumulation period ~~based on the stored image signal.~~

38. (Currently Amended) ~~The~~ An apparatus according to claim 36, wherein said first measurement system and said second measurement system measure the position of the mark and the positions of the stage, respectively, during substantially the same observation period.

39. (Currently Amended) ~~The~~ An apparatus according to claim 36, wherein after said stage moves to a position where said first measurement system can measure the position of the mark and before said stage stops, said first measurement system and said second measurement system start measuring the position of the mark and the positions of the stage, respectively.

40. (Currently Amended) ~~The~~ An apparatus according to claim 36, wherein said first measurement system comprises an off-axis scope.

41. (Currently Amended) ~~The~~ An apparatus according to claim 36, wherein said second measurement system comprises an interferometer.

42. (Currently Amended) ~~The~~ An apparatus according to claim 36, wherein
the substrate has a plurality of areas to be exposed, and the mark is formed in
correspondence with each of the plurality of areas, and
a position of each of the plurality of areas is calculated based on the positions of
the marks obtained ~~for~~ with respect to a subset of the plurality of areas.

43. (Currently Amended) ~~The~~ An apparatus according to claim 42, wherein said
calculation section calculates a positional deviation of the mark with respect to each of the
subsets based on the position of the mark measured by said first measurement system and the

positions of the stage measured by said second measurement system, and calculates the position of the stage with respect to each of the plurality of areas based on the positional deviations.

44. (Currently Amended) ~~The~~ An apparatus according to claim 39, wherein said apparatus is arranged such that said stage is moved at a substantially constant speed in the position where said first measurement system can measure the position of the mark.

45. (Currently Amended) ~~The~~ An apparatus according to claim 36, further comprising a determination system which determines a mode to be applied when said calculation section calculates the positions of the mark.

46. (Currently Amended) ~~The~~ An apparatus according to claim 45, wherein said determination system determines the mode based on the position of the mark and the positions of ~~the~~ said stage, which are measured by said first measurement system and said second measurement system, respectively, while placing, on said stage, the substrate having the mark which is formed by exposing a pattern by said exposure apparatus system, respectively.

47. (Currently Amended) A method for determining a position of a mark on an object placed on a stage, said method comprising steps of:

first measuring of a position of a mark formed on the object based on image data of one accumulated image of the mark that is obtained by accumulating image signals

corresponding to an image of the mark ~~within~~ formed on an image sensor during an accumulation period;

second measuring of a position of the stage plural times during the accumulation period ~~in said first measuring step~~ of the image sensor; and

calculating the position of the mark based on ~~a measurement result~~ data of the position of the mark measured based on the image data in said first measuring step and ~~measurement results~~ data of plural positions of the stage measured in said second measuring step during the accumulation period of the image sensor with respect to the image data.

48. (Currently Amended) A method adapted for an exposure apparatus having a stage on which a substrate is placed, and a lens section which projects a pattern onto the substrate, said method comprising steps of:

first measuring of a position of a mark formed on the substrate based on image data of one accumulated image of the mark that is obtained by accumulating image signals corresponding to an image of the mark ~~within~~ formed on an image sensor during an accumulation period;

second measuring of a position of the stage plural times during the accumulation period ~~in said first measuring step~~ of the image sensor;

calculating the position of the mark based on ~~a measurement result~~ data of the position of the mark measured based on the image data in said first measuring step ~~and~~

~~measurement results~~ and data of plural positions of the stage measured in said second measuring step during the accumulation period of the image sensor with respect to the image data; and
driving the stage based on data of the position of the mark calculated in said calculating step.

49. (Currently Amended) A method of manufacturing a device, using an exposure apparatus having a stage on which a substrate is placed, and a lens section which projects a pattern onto the substrate, said method comprising steps of:

placing the substrate applied with a resist on the stage;

first measuring of a position of a mark formed on the substrate based on image data of one accumulated image of the mark that is obtained by accumulating image signals corresponding to an image of the mark ~~within~~ formed on an image sensor during an accumulation period;

second measuring of a position of the stage plural times during the accumulation period ~~in said first measuring step~~ of the image sensor;

calculating the position of the mark based on ~~a measurement result~~ data of the position of the mark measured based on the image data in said first measuring step and ~~measurement results~~ data of plural position of the stage measured in said second measuring step during the accumulation period of the image sensor with respect to the image data;

aligning the substrate using the stage in the exposure apparatus based on data of
the position of the mark calculated in said calculating step; and
transferring a pattern to the substrate using the lens section.

50. (Currently Amended) An apparatus for determining a position of a mark on an object placed on a stage, said apparatus comprising:

a first measurement system which has an image sensor and measures the position of the mark based on image data of one accumulated image of the mark that is obtained by accumulating image signals corresponding to an image of the mark ~~within an~~ formed on said image sensor during an accumulation period;

a second measurement system which measures a position of the stage plural times during the accumulation period of said ~~first measurement system~~ image sensor; and

a calculation section which calculates the position of the mark based on a ~~measurement result~~ data of the position of the mark measured based on the image data by said first measurement system and ~~measurement results~~ data of plural positions of said stage measured by said second measurement system during the accumulation period of said image sensor with respect to the image data.